System 3 to 7 Sound and Speech Combo Board Manual

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Rev 02

Warning: There are hazardous and potentially fatal voltages inside a pinball machine!

- ✓ **When replacing boards and working around the machine be sure to unplug the machine.**
- ✓ **Never disconnect and/or reconnect boards with the machine plugged in!**
- ✓ **Never directly touch any component and/or wire with the machine plugged in.**
- ✓ **Always replace a blown fuse with the correct size fuse. Do not increase the fuse size if it keeps blowing. If this occurs there is something wrong with the machine.**
- ✓ **Always use a grounded plug. Never cut off the ground terminal of the plug or use a two to three prong converter.**

Installation/Configuration:

The Kohout Enterprises Replacement Sound / Speech Combo Board for the Williams D8224 and the Speech Module C8225 are identical to the original Sound Board. The mounting holes and connection to the Speech Module is not required. All the connections are identical to the original Sound Board connections.

Connections:

J1 – AC Power Input (18 V.A.C) from the power plug. This 9-pin connector should have 3 wires, one on each end and one in the center.

J2 – Speaker output. This 4-pin connector should have 2 wires with terminals 1 and 2 jumpered and terminals 3 and 4 jumpered.

J4 – Volume control to main cabinet. This 4-pin connector goes to a shielded, 3 wire cable. It should have a bare shielded ground wire and red and black signal wires.

J3 – Signal Controls. This 9-pin connector has the approximately 5 signal wires from the main board to control the output of the sound board.

ROM Type DIP Switch Settings:

Game	Switch to ON	Switch to OFF
All Pinball Machines with Speech Module using 2732 EEPROMS for IC4 to IC7	W2, W7, W9, SPW1, SPW3	W3, W4, W8, SNDW1, SPW2, SPW4
All Pinball Machines with Speech Module using 2532 EEPROMS for IC4 to IC7	W2, W7, W9, SPW2, SPW4	W3, W4, W8, SNDW1, SPW1, SPW3
All Pinball Machines without Speech Module that originally used the D8224 Sound Board (larger board with 2 fuses)	W2, W7, W9, SNDW1	W3, W4, W8, SPW1, SPW2, SPW3, SPW4
All Pinball Machines that originally used the older D8066 Sound Board (Smaller board with 1 fuse and volume control on board)	W2, W8, W9, SNDW1	W3, W4, W7, SPW1, SPW2, SPW3, SPW4
All Arcade Games with Speech using 2732 EPROM for IC4 to IC7	W3, W4, W7, SPW1, SPW3	W2, W8, W9, SNDW1, SPW2, SPW4
All Arcade Games with Speech using 2532 EPROM for IC4 to IC7	W3, W4, W7, SPW2, SPW4	W2, W8, W9, SNDW1, SPW1, SPW3

Note: These should be similar to the original, however, sometimes because of different ROMs used, the original manual may state slightly different settings. If you are having a problem with these settings and a particular game, please contact Kohout Enterprises, L.L.C. More information is available at www.pinballpcb.com.

DIP Switch Original Jumper Settings:

The switch settings are very game dependant; however, typically DS1 is for the type of sound used. Some older games use bell type tones instead of digital sounds, especially, games that used the D8066 sound board.

DS2 was typically used for games with speech. This must switched to ON for the speech to work. **Switching this to "OFF" typically disables the speech even when the speech ROMS are installed.**

DIAG Switch:

Once triggered, the board will cycle through the diagnostics until the power is turned off. Once this occurs, the board will reset in the normal condition. Note that all of the sounds and speech will not be output during the diagnostics. Only portions of the full sounds and/or speech are output during the diagnostic routine. This is identical to the original.

Replacements/Substitutions:

1. IC9 – Microprocessor must be a 6802 from multiple manufacturers
2. IC10 – 6821 PIA can be a 6821 or 68B21 from multiple manufacturers. The 68B21 was a later version with faster timing specifications.
3. IC13 – MC1408 is an 8-bit DAC (Digital to Analog Converter) originally from Motorola, but also available from other manufacturers. It can be directly replaced with a National Semiconductor DAC0808 or an Intersil HI5628.

All of the other IC's and components should be readily available from a standard electronics distributor. Additionally, Kohout Enterprises, L.L.C., stocks all the required components and are available for ordering.

Warranty:

The board has a 30-day unconditional warranty. If you would like to return it for any reason within 30 days after receiving, your cost will be refunded, minus shipping. The board also has a 1-year replacement/repair warranty. If it fails within 1 year, it will be replaced or repaired free of charge. Shipping charges are extra and are the responsibility of the purchaser.

Disclaimer:

Kohout Enterprises, L.L.C., is not liable or responsible for the use of this board. Any damage caused by use of this board whether it is incidental, special, or consequential is the sole responsibility of the end user and this end user accepts all risks. Kohout Enterprises, L.L.C. is not charging and/or selling the ROM image of the original Williams EEPROM flash code.

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Bill of Material for SoundSpeechCombo.Bom

Used Part Type              Designator Footprint
==== ===================== ========== ============
20   0.1u                  C6 C7 C8   RAD0.2
                           C16 C17
                           C18 C19
                           C20 C21
                           C22 C23
                           C30 C31
                           C35
                           C38 C39
                           C40 C41
                           C42 C56
2    0.01u                 C9 C10     RAD0.2
1    0.047u                C37        RAD0.2
1    1.52n                 C11        RAD0.2
2    1K                    R10 R22    AXIAL0.4
1    1N4730A               ZR1        AFL-W2/X1.8D
2    1N4736A               ZR2 ZR3    AFL-W2/X1.8D
2    1u                    C3 C36     RAD0.2
3    1u                    C1 C2 C14  RB.1/.2
2    2.2K                  R19 R21    AXIAL0.4
2    2.7k                  R13 R14    AXIAL0.4
1    2N4401                Q2         TO92E
1    3.3K                  R24        AXIAL0.4
1    3.3M                  R25        AXIAL0.4
1    3.58MHz               Y1         XTAL1
2    4.7                   R15 R18    AXIAL0.4
2    4SB                   F1 F2      FUSEPC4T
2    5.6k                  R1 R23     AXIAL0.4
3    10k                   R4 R16 R17 AXIAL0.4
3    10u                   C15        RB.1/.2
                           C29 C44
2    15k                   R12 R26    AXIAL0.4
5    27k                   R6 R7 R8   AXIAL0.4
                           R9 R11
2    27p                   C12 C32    RAD0.1
1    36k                   R5         AXIAL0.4
1    45k                   R2         AXIAL0.4
1    47p                   C28        RAD0.2
2    100u                  C5 C43     RB.1/.2
1    180k                  R3         AXIAL0.4
1    180p                  C24        RAD0.2
1    220k                  R20        AXIAL0.4
1    1200p                 C25        RAD0.2
1    1800p                 C27        RAD0.2
5    2532/2716             IC4 IC5    DIP-24-Wide
                           IC6 IC7
                           IC12
1    4068                  IC18       DIP-14
1    4069                  IC17       DIP-14
1    4700p                 C33        RAD0.2
1    4700u                 C26        RB.3/.6
1    4700uF                C4         RB.3/.6
1    6802/6808             IC9        DIP-40
1    6821/68B21            IC10       DIP-40
1    7408                  IC14       DIP-14
1    BRIDGE1               BR1        D-37R
2    CD40106               IC15 IC16  DIP-14
3    CON4                  J2 J4 JSP2 MT6CON4V
1    CON9                  J3         MT6CON9V
1    HC55564               IC1        DIP-14
2    HEADER8X2DIP          JPSND JPSP DIP-16
1    LED1                  5V         LEDT1
1    LED2                  POS12V     LEDT1
1    LED3                  NEG12V     LEDT1
1    MC1408                IC13       DIP-16
1    MC7805T               IC8        TO-220UP
1    MCP100-450DI          IC3        TO-92
1    RESPACK-3.3K          SR1        SIP10
1    RESPACK-4.7k          SR29       SIP10
1    RPOT1                 VRMIXER
1    SN7442AN              IC2        DIP-16
1    SW-PB                 SMAINDIAG  PBSW
1    TDA7264               IC11       MW8AMP
1    TL074                 IC30       DIP-14
0    TL7705A               IC19       DIP-8             DO NOT INSTALL
0     10u                   C13       RB.1/.2           DO NOT INSTALL
0     0.1u                  C34       RAD0.2            DO NOT INSTALL
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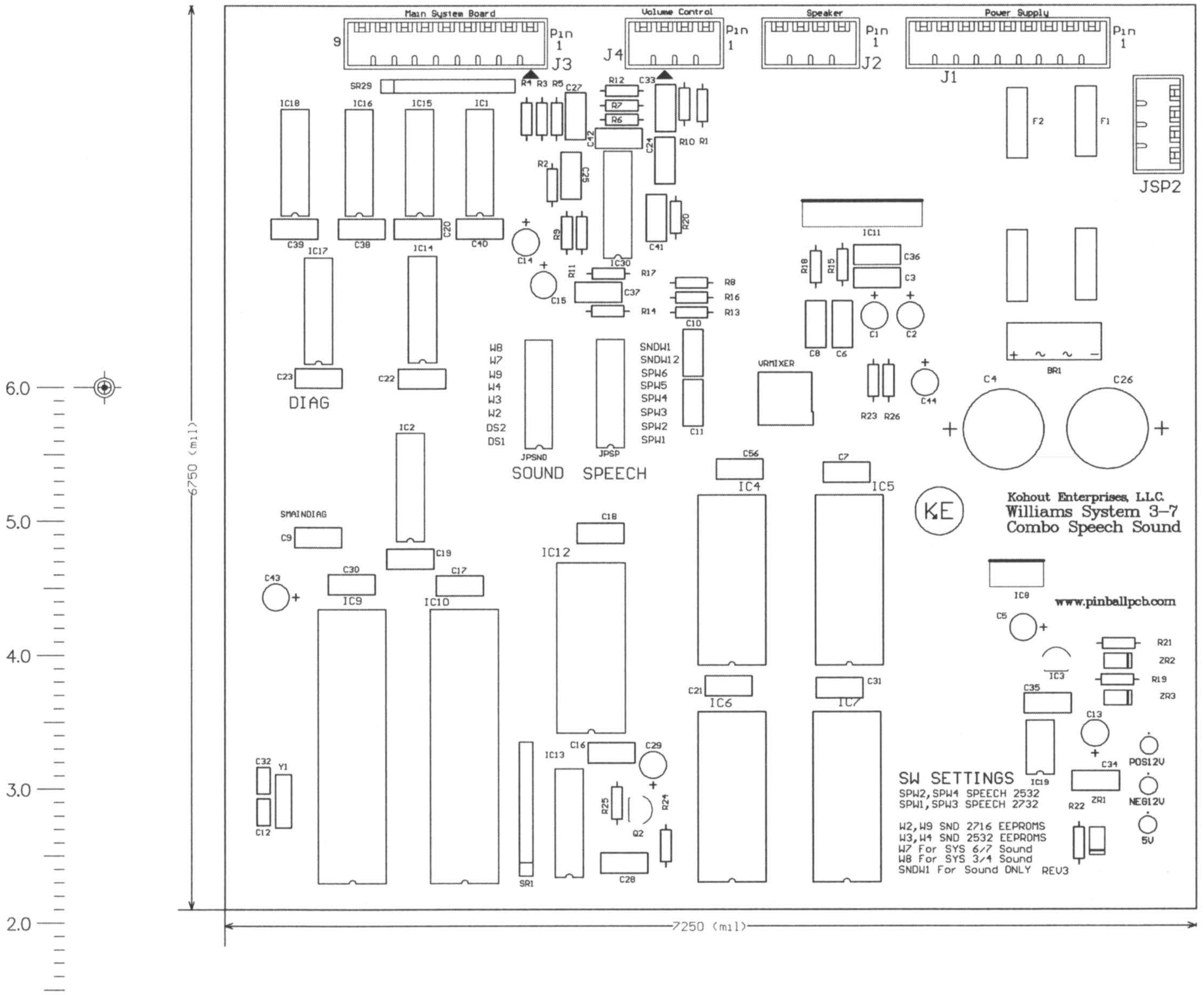
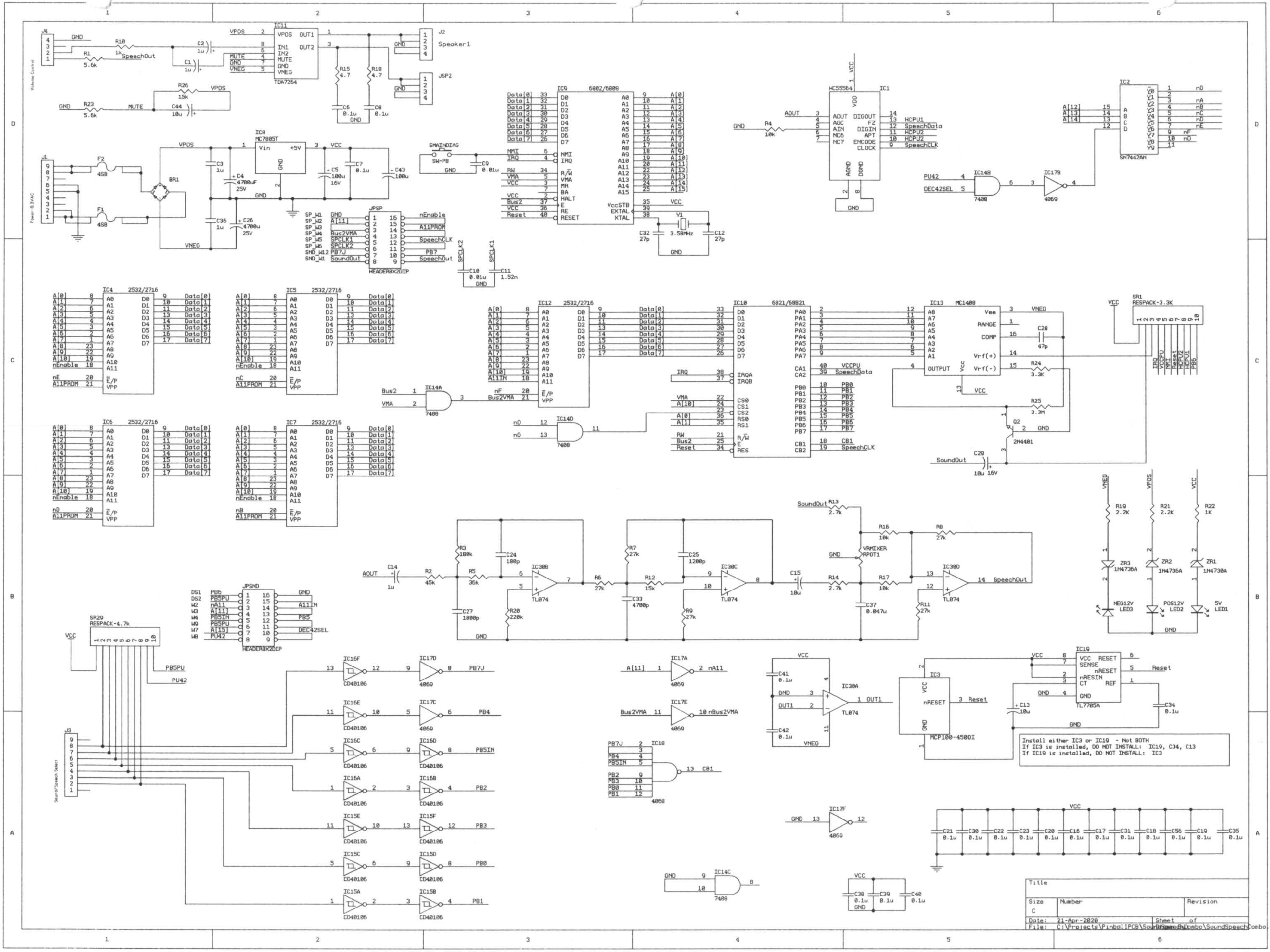

Kohout Enterprises, L.L.C.
Williams System 3–7
Combo Speech Sound
www.pinballpcb.com
KE
SW SETTINGS
SPW2,SPW4 SPEECH 2532
SPW1,SPW3 SPEECH 2732
W2,W9 SND 2716 EEPROMS
W3,W4 SND 2532 EEPROMS
W7 For SYS 6/7 Sound
W8 For SYS 3/4 Sound
SNDW1 For Sound ONLY
REV3
Main System Board
Volume Control
Speaker
Power Supply
Pin 1
J1
J2
J3
J4
JSP2
9
SOUND
SPEECH
DIAG
JPSND
JPSP
W8
W7
W9
W4
W3
W2
DS2
DS1
SNDW1
SNDW12
SPW6
SPW5
SPW4
SPW3
SPW2
SPW1
SMAINDIAG
VRMIXER
BR1
F1
F2
POS12V
NEG12V
5V
SR29
SR1
Y1
Q2
ZR1
ZR2
ZR3
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
IC9
IC10
IC11
IC12
IC13
IC14
IC15
IC16
IC17
IC18
IC19
IC30
C4
C26
7250 (mil)
6750 (mil)
6.0
5.0
4.0
3.0
2.0



Install either IC3 or IC19 - Not BOTH
If IC3 is installed, DO NOT INSTALL: IC19, C34, C13
If IC19 is installed, DO NOT INSTALL: IC3

Title		
Size C	Number	Revision
Date: 21-Apr-2020	Sheet of	
File: C:\Projects\PinballPCB\SoundSpeechCombo\SoundSpeechCombo.ddt		